

PATENT SPECIFICATION

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COMPLETE SPECIFICATION

Improvements in or relating to housing linings for elastic fluid flow machines, in particular gas-turbine engines

We, M.A.N. TURBO G.M.B.H., a German Company, of Dachauer Strasse 665, 8 Munchen-Allach, Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to a housing lining for fluid flow machines, in particular gas turbine engines, which permits the end tips of engine rotor blades to sweep over said housing lining and produce a slight abrasion on the lining surface particularly on first starting the engine. Such a housing lining will hereinafter be referred to as a "housing lining of the kind specified".

In elastic fluid flow machines, the clearance between the respective rotor and the corresponding housing should be made as small as possible in order to avoid losses. This is made possible by what are called abrasion or wear surfaces, which are applied to the inner wall of the respective housing, and which owing to their easy machinability, render grazing of the rotors harmless, even at the highest speeds.

According to the present invention there is provided a method of manufacturing a housing lining of the kind specified including the steps of initially mechanically roughening an inner housing surface in a known manner, spraying a thin and rough adhesion layer of high-melting molybdenum on the roughened surface of the housing, subsequently spraying a wear layer of magnesium alloy having substantially 9% aluminium and 2% tin on this adhesion layer simultaneously with a spray of a graphite suspension in an organic carrier liquid, and

finally evaporating the carrier liquid from the abradable sprayed metal layer by heating.

The advantages of the invention are to be seen principally in the fact that the housing lining represents a compact layer, closed on itself, which compared with the prior art, is applied to the housing inner surface with substantially simpler means and without considerable expenditure for assembly work and so forth, and which owing to the high dimensional accuracy ensures satisfactory starting up without gap losses.

A further important advantage is that the housing lining made by the method of the invention can be used for any desired curved contour of the housing, for example in a radial compressor, easy machinability, adhesion, resistance to thermal shock and easy production and processing being provided in every case as being the most important properties of the abrasion surface. Further details are explained more fully by way of example in the following detailed description.

For applying the housing lining for rotors of flow machines, the housing inner surface is mechanically roughened before the application of an adhesion layer. Thereupon, an adhesion layer of high-melting molybdenum is sprayed on the inner surface of the housing, and thus forms a thin, rough coating, capable of close engagement. The actual one-piece abrasion surface or wear layer, closed on itself (i.e. extending right round the inner housing surface), is applied to said adhesion layer. For this purpose, a magnesium alloy with 9% aluminium and 2% tin is sprayed by means of spray guns on the adhesion layer, with simultaneous spraying

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thereon of a graphite suspension in an organic carrier liquid, the respective workpiece being rotated on a device. For the carrier liquid, which advantageously is injected into the metal spraying jet at a variable angle, it is possible to use perchloroethylene, light oil or aviation fuel, said carrier liquid being subsequently evaporated from the abradable sprayed metal layer by heating after the lining has been sprayed on.

Depending on the particular requirements, the wear layer may be sprayed on with overdimensioning, and may be subsequently machined mechanically to the required dimensions.

The advantages of the use of a magnesium alloy for the wear layer are that magnesium is the lightest of all spraying metals, and in addition is the easiest machinable metal, and hence is particularly suitable as abrasion material. The graphite addition supplied during metal spraying advantageously promotes machinability of the abradable surface.

WHAT WE CLAIM IS:

1. A method of manufacturing a housing lining of the kind specified including the steps of initially mechanically roughening an inner housing surface in a known manner, spraying a thin and rough adhesion layer of

high-melting molybdenum on the roughened surface of the housing, subsequently spraying a wear layer of magnesium alloy having substantially 9% aluminium and 2% tin on this adhesion layer simultaneously with a spray of a graphite suspension in an organic carrier liquid, and finally evaporating the carrier liquid from the abradable sprayed metal layer by heating.

2. A method according to claim 1, characterised in that perchloroethylene, light oil or aviation fuel are used as the carrier liquid for the graphite suspension.

3. A method according to claim 1 or claim 2, characterised in that the carrier liquid is injected at a variable angle into the metal spraying jet.

4. For a fluid flow machine, a housing lining made by the method of any of claims 1 to 3.

5. A method of manufacturing a housing lining of the kind specified, substantially as hereinbefore described.

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